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CLAIMS

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is as follows:

1. A method for reducing motion artifacts and patient dose in radiological imaging using four dimensional computed tomography (4D CT), comprising the steps of:

identifying artifacts in 4D CT images of an anatomy being imaged, said image artifacts being responsive to irregularities in a periodic motion of said anatomy;

measuring said periodic motion of said anatomy so as to detect said irregularities;

controlling a 4D CT scan of said anatomy so as to pause the scan during periods having said detected irregularities.

2. A method as in claim 1, wherein said anatomy is a lung and said measuring step uses a respiratory signal.

3. A method as in claim 2, wherein said measuring step further comprises the steps of:

recording said respiratory signal over a plurality of breathing cycles; and

constructing an envelope of spatial and temporal tolerances, wherein regular ones of said plurality of breathing cycles are within said envelop and irregular ones of said plurality of breathing cycles extend beyond said envelope.

1　　4. The method of claim 3, wherein said controlling
2　step further includes the steps of:
3　　　　acquiring a respiratory signal during said 4D
4　CT scan;
5　　　　applying said envelope to said respiratory
6　signal; and
7　　　　adapting said 4D CT scan to said respiratory
8　signal by excluding from said 4D CT scan data
9　acquired when said respiratory signal is not within
10　said envelope.

1　　5. The method of claim 4, wherein data acquired
2　during irregular respiratory cycles is excluded by
3　pausing said 4D CT scan data acquisition when said
4　respiratory signal is not within said envelope.

1　　6. A system for reducing motion artifacts and
2　patient dose in radiological imaging using four
3　dimensional computed tomography (4D CT),
4　comprising:
5　　　　means for identifying artifacts in 4D CT
6　images of an anatomy being imaged, said image
7　artifacts being responsive to irregularities in a
8　periodic motion of said anatomy;
9　　　　means for measuring said periodic motion of
10　said anatomy so as to detect said irregularities;
11　　　　means for controlling a 4D CT scan of said
12　anatomy so as to pause the scan during periods
13　having said detected irregularities.

1　　7. A system as in claim 6, wherein said anatomy is
2　a lung and said measuring means uses a respiratory
3　signal.

1   8.   A system as in claim 7, wherein said measuring
2   means further comprises:
3   means for recording said respiratory signal
4   over a plurality of breathing cycles; and
5   means for constructing an envelope of spatial
6   and temporal tolerances, wherein regular ones of
7   said plurality of breathing cycles are within said
8   envelop and irregular ones of said plurality of
9   breathing cycles extend beyond said envelope.

1   9.   The system of claim 8, wherein said controlling
2   step further comprises:
3   means for acquiring a respiratory signal
4   during said 4D CT scan;
5   means for applying said envelope to said
6   respiratory signal; and
7   means for adapting said 4D CT scan to said
8   respiratory signal by excluding from said 4D CT
9   scan data acquired when said respiratory signal is
10   not within said envelope.

1   10. The system of claim 9, wherein data acquired
2   during irregular respiratory cycles is excluded by
3   pausing said 4D CT scan data acquisition when said
4   respiratory signal is not within said envelope.

1   11. A method for reducing motion artifacts in
2   radiological imaging using four dimensional
3   computed tomography (4D CT), comprising the steps
4   of:
5   identifying artifacts in 4D CT images of an
6   anatomy being imaged, said image artifacts being

7   responsive to irregularities in a periodic motion
8   of said anatomy;
9   measuring said periodic motion of said anatomy
10   so as to detect said irregularities;
11   controlling post-processing of a 4D CT scan of
12   said anatomy so as to omit data acquired during
13   periods having said detected irregularities.

1   12. A method as in claim 11, wherein said anatomy
2   is a lung and said measuring step uses a
3   respiratory signal.

1   13. A method as in claim 12, wherein said
2   measuring step further comprises the steps of:
3   recording said respiratory signal over a
4   plurality of breathing cycles; and
5   constructing an envelope of spatial and
6   temporal tolerances, wherein regular ones of said
7   plurality of breathing cycles are within said
8   envelop and irregular ones of said plurality of
9   breathing cycles extend beyond said envelope.

1   14. The method of claim 13, wherein said
2   controlling step further includes the steps of:
3   acquiring a respiratory signal during said 4D
4   CT scan;
5   applying said envelope to said respiratory
6   signal; and
7   adapting said 4D CT scan to said respiratory
8   signal by excluding during said post-processing of
9   said 4D CT scan data acquired when said respiratory
10   signal is not within said envelope.

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1   15.   The method of claim 14, wherein data acquired
2   during irregular respiratory cycles is excluded by
3   omitting data acquired during said 4D CT scan when
4   said respiratory signal was not within said
5   envelope.